REMARKS

The Office Action of April 10, 2001, has been carefully considered.

It is noted that the drawings are objected to on various grounds.

The Abstract of the Disclosure is also objected to.

The specification is objected to under 35 USC 112, first paragraph.

The disclosure is objected to for containing various informalities.

Claims 13 and 14 are objected to for containing various informalities.

Claims 11-20 are rejected under 35 USC 112, first paragraph.

Claims 11-20 are rejected under 35 USC 112, second paragraph.

Finally, claims 11-20 are rejected under 35 USC 103(a) over the patent to Pleschiutschnigg '503 in view of the patent to Coassin '220.

In connection with the Examiner's objection to the drawings applicants have enclosed herewith a Letter With Proposed Drawing Changes in which Figure 5b is proposed to be changed to include the reference numeral 52. Concerning the reference numeral 47, this reference numeral was introduced on page 8 of the preliminary amendment filed with the original application. As for the remaining points raised by the Examiner, applicants have revised the specification as needed so that it is believed the drawings are now in proper form.

In view of these considerations it is respectfully submitted that the various objections to the drawings are overcome and should be withdrawn.

Applicants have amended the Abstract of the Disclosure to revise the first sentence thereof. With this revision it is respectfully submitted that the objection to the abstract is overcome and should be withdrawn.

Relative to the Examiner's objections to the specification, applicants have amended the specification to provide consistent terminology and to address the other problems of indefiniteness raised by the Examiner.

In view of these considerations it is respectfully submitted that the objections to the specification are overcome and should be withdrawn.

In view of the Examiner's objections to and rejections of the claims applicants have amended claims 11-14, 16 and 18.

Applicants have amended claims 13 and 14 to address the informalities pointed out. With these changes it is respectfully submitted that the objection to claims 13 and 14 is overcome and should be withdrawn.

Relative to the rejection of claims 11-20 under 35 USC 112, first paragraph, applicants have amended the claims so that consistent terminology is now present and have also amended the claims to address the other points raised by the Examiner. Thus, it is respectfully submitted that the rejection of claims 11-20 under 35 USC 112, first paragraph, is overcome and should be withdrawn.

It is respectfully submitted that the claims now on file particularly point out and distinctly claim the subject matter which applicants regard as the invention. Applicants have amended the claims to address the instances of indefiniteness cited by the Examiner. Concerning the terms "broad" and "narrow", applicants wish to point out that these are terms when used in connection with molds and metal casting are well known to those skilled in the art. For example,

applicants direct the Examiner's attention to Coassin '220 where in column 5, line 65 "The wide sides 15 and narrow sides 14" are discussed. Similarly, Pleschiutschnigg '503 also refers to narrow sides and broad sides. Thus, it is respectfully submitted that the terms "broad" and "narrow" are not indefinite and are readily understood by those skilled in the art. All these terms mean is that the broad sides are broader than the narrow sides and the narrow sides are narrower than the broad sides. Concerning the antecedent basis for "the slab narrow faces" applicants direct the Examiner's attention to subparagraph c) of claim 11. The "planar slab central part" of claim 13 finds antecedent basis in section d) of claim 11.

Applicants have made numerous changes to the claims in an effort to address the Examiner's concerns of indefiniteness.

In view of these changes and the above considerations it is respectfully submitted that the rejection of claims 11-20 under 35 USC 112, second paragraph, is overcome and should be withdrawn.

It should be mentioned that the present invention deals with a process for producing and a continuous casting installation for producing thin slabs. Thin slab technology has only been available since 1985, although continuous casting itself is much older. Thin slab casting involves molds generally having a cross section of about 50 mm x 1600 mm. The mold width can, however, also be smaller or greater than 1600 mm. With such comparatively thin slabs different factors must be taken into consideration not only in the shape of the mold but also concerning cooling in the mold and additional guide stands, than when dealing with thick slabs. In other words, even the smallest differences are of extreme significance.

Both Coassin '220 and Pleschiutschnigg '503 deal with so-called dished molds whereas the presently claimed invention deals with a funnel mold. With a dished mold the broad

sidewalls are curved outward and this curvature extends from the upper edge of the mold all the way to the lower edge of the mold so that the strand leaves the mold with a curved shape. In a funnel mold, on the other hand, the curvature is only present over a portion of the length of the mold and the lower edge of the mold has a rectangular cross section.

Due to this change in the mold the strand goes through a change in shape which is very critical due to the thin strand shell. Thus, the construction of the surfaces on the inner side of the mold is extremely important. As can be seen in both references, a curved strand exits the mold. Thus, the combination of references relied upon by the Examiner does not teach or suggest a process or a casting installation which has planar surface parts, as in the presently claimed invention.

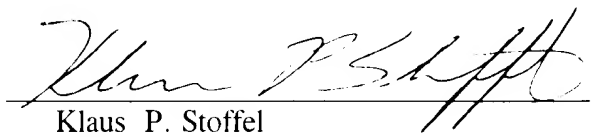
In view of these considerations it is respectfully submitted that the rejection of claims 11-20 under 35 USC 103(a) over a combination of the above-discussed references is overcome and should be withdrawn.

Reconsideration and allowance of the present application are respectfully requested.

It is believed that no fees or charges are required at this time in connection with the present application; however, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

COHEN, PONTANI, LIEBERMAN & PAVANE

By 

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IN THE SPECIFICATION:

Page 1, starting at line 11:

German reference DE 41 31 [828] 829 C2 discloses a liquid-cooled width-adjustable plate mold for the continuous casting of strands of steel in slab format, in particular for a thickness of the slabs below 100 mm. In the plate mold, the form of the broad-face plates at the strand outlet end of the mold corresponds to the strand format to be produced, the broad-face plates being designed as a planar surface in the adjusting region of the narrow-face plates.

starting at line 22:

German reference DE [38] 36 27 991 discloses an apparatus for continuously casting flat slabs, in particular a steel slab with a thickness below 80 mm. In this apparatus there is, opposite the larger crowned cross section on the charging side, a cross section on the strand outlet side of the mold which is smaller and identically crowned in the central region, and at least one roller of at least one pair of rollers of the supporting and guiding means following the mold has a caliber adapted to the emerging crowned strand.

Page 7, the paragraph starting at line 17:

The mold has in this case broad faces 21, between which narrow faces 22 are clamped. The broad faces have a central surface 23, which is shaped with a planar surface and

is disposed from the inlet up to the mouth of the mold. The greatest distance between the broad faces is designated D_E in Figure 1.

Page 8, starting at line 18:

In the charging region, the side [plates] parts have a width f which, following the conical transitional part 26 or 27, widens to the width g and maintains this width constantly up to the mouth of the mold.

starting at line 22:

In Figure 2, in the charging region, the central [plate] part has a width c which, following the wedge-shaped transitional parts 26, 27, widens to the width b in the strand casting direction up to the length a of the mold and, from there, remains constant up to the mouth of the mold.

Page 9, starting at line 2:

In the case of this configuration, the width f of the side [plates] parts 24 and 25 remains constant over the entire length L of the mold.

starting at line 5:

An immersion nozzle 11, which has a tubular part 12 and a [spade-shaped] rectangular part 14, protrudes into the mold. The mouth 13 of the said immersion nozzle reaches under the level of the melt Sp (dashed line). The immersion nozzle has a thickness d.

starting at line 9:

Figure 3 shows a section [aa] AA through the broad faces 21 of the mold.

starting at line 11:

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Represented in the left-hand part of Figure 3 is the planar-surface central [plate] part 23, which at the distance a goes over into a straight region, disposed parallel to the opposite central [plate] part.

starting at line 15:

In the right-hand part of Figure 3, a first portion of the central [plate] part 23 has a planar surface and is disposed parallel to the center axis I. This parallel part is adjoined with a tangential transition by a connecting part 29, which has in section an S-shaped form and in turn goes over into the parallel part of the central [plate] part 23 in the direction of the mouth.

Page 10, the paragraph starting at line 3:

The dashed line represents the distance D_S between the side [plates] parts 24 and 25, and consequently also the narrow face of the slab.

starting at line 10:

Represented in the right-hand part of Figure 4 is the side [plate] part 24, which has a constant width g.

starting at line 12:

Represented in the left-hand part of Figure 4 is the side [plate] part 25, which has in the inlet region of the mold a width f which, conically following the conical transitional part, has from the wedge tip 28 a width g.

starting at line 16:

The central [plate] part 23 has with regard to the left-hand side of the figure a constant width b.

starting at line 18:

With regard to the right-hand side, the central [plate] part 23 has a width c which widens in a way corresponding to the conical transitional part 26 and has from the wedge tip 28 the constant width b.

Page 11, starting at line 12:

Figures 5a and 5b show a section through the guiding framework and the slab still having a crater in this region. Represented in Figure 5a is the situation with the opposite pairs of rollers in the central region 43 and in the side regions 44, 45. These rollers support the broad faces 51 of the shell box made up of the broad faces 51 and the narrow faces 52 of the strand shell B. The shell box thereby [envelopes] envelops the melt S, which forms in this region the crater within the slab.

IN THE CLAIMS:

Please amend the claims as follows:

11. (Amended) A process for producing a thin slab having broad faces with a predetermined convexity in a continuous casting installation, in which an immersion nozzle protrudes into a mold composed of broad and narrow faces followed by a strand guiding means for guiding the slab which comprises a strand shell surrounding a liquid sump, said process comprising the steps of:

a) forming broad faces of the strand shell to have planar surfaces in a region of the immersion nozzle [which is shaped in the form of a spade], and simultaneously be parallel with respect to their contour lines;

b) outside a [shadow] region of the immersion nozzle, shaping said broad faces of the strand shell with planar surfaces that taper conically toward the narrow faces;

c) in a strand casting direction, feeding parts of the slab broad faces shaped with planar surfaces conically to each other up to [a longitudinal extent] 40 to 60% of the mold [of from 40 to 60%] length to such a degree that lateral edges of the faces adapt themselves to ends of the planar parts of the slab broad faces tapering conically with respect to narrow faces of the slab;

d) joining [wedge-shaped] tapered connecting pieces with the [surface-like] central parts of the slab broad faces with respective planar-surface edge parts of the slab broad faces; and

e) subsequently, in a mouth region and after leaving the mold, maintaining convexity formed by in each case three planar surface parts of the broad faces of the strand shell constant in its form as far as a lowest point of a liquid crater of the slab.

12. (Amended) A process as defined in claim 11, including reducing slab thickness in a region of a strand guiding framework by only deforming the [slab] narrow faces of the slab.

13. (Amended) A process as defined in claim 11, wherein the [wedge-shaped] tapered connecting pieces between the [planar slab] central part of the slab, located in the [shadow] region of the immersion nozzle, and the slab broad-face parts tapering conically toward the narrow faces are given a form which encloses an angle $\alpha < 5°$ in a longitudinal [extent] direction of the [slab] central parts of the slab and represents a crowned surface which, having a central point of inflection, adjoins tangentially at its edges to two neighboring surfaces.

14. (Amended) A continuous casting installation for producing [an] a thin slab, comprising:

a laterally adjustable mold, the mold having broad side parts, narrow side parts, a large crowned cross-section on a charging side and a cross-section, opposite the crowned cross-section, on [an] a strand outlet side which is smaller than the crowned cross-section and identically crowned in a central region;

an immersion nozzle that protrudes into the mold, the immersion nozzle having a [spade-shaped] mouth with a maximum thickness (d) corresponding to d = 0.3 to 0.5 x D_F, where D_F is a distance between the mold broad face parts in [the] a charging region, the broad-[face] side parts having at least in a [shadow] region of the immersion nozzle central parts which are arranged parallel to one another according to their contour lines, the broad-[face]side parts being formed, at least in an adjusting region of the narrow-[face]side parts, as planar side surfaces, the planar side surfaces being movably arranged so that they move conically toward each other in a direction of the narrow [face]-side parts, the [planar-surface] central part being connected to the planar-surface side surfaces by transitional parts, the transitional parts tapering

toward each other [in a wedge form] and having a [wedge] tip that ends at a distance (a), measured from an upper edge of the mold, with a = 0.5 to 0.8 x L, where L = the length of the mold; and

pairs of supporting and guiding rollers which follow the mold and have a caliber adapted to an emerging crowned strand, the supporting and guiding rollers having a contour which corresponds to the [planar-surface] central [plate] part and the [planar] side [plates] parts of the mold broad faces in a region of [the] a mouth of the mold.

16. (Amended) A continuous casting installation as defined in claim 14, wherein the central parts are shaped with planar surfaces in the [shadow] region of the immersion nozzle up to a = 0.5 to 0.8 x L and are arranged so as to be disposed parallel to one another, the mold further having connecting parts with contour lines, the connecting parts being parallel with respect to their contour lines and having in [the] a strand conveying direction an S-shaped form with ends that respectively go over tangentially into a preceding and following part of the central part, the transitional parts being adapted to the connecting part in their longitudinal extent up to the [wedge] tip.

18. (Amended) A continuous casting installation as defined in claim 14, wherein the supporting and guiding rollers are split rollers having bearings provided in a region of the [planar-surface] central part.